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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/687,788

10/17/2003

Shamci Monajembashi

SHA-001

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7590

03/31/2009

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P.O. BOX 2-E

SAN JOSE, CA 95109-0005

EXAMINER

WHALEY, PABLO S

ART UNIT

PAPER NUMBER

1631

MAIL DATE

DELIVERY MODE

03/31/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/687,788	<b>Applicant(s)</b> MONAJEMBASHI, SHAMCI	
	<b>Examiner</b> PABLO WHALEY	<b>Art Unit</b> 1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19, 21, 24-27 and 28-32 is/are pending in the application.
- 4a) Of the above claim(s) 1-15 and 27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-19, 21, 24-26 and 28-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Status of Claims***

Claims 1-19, 21, 24-27, and 28-32 are pending.

Claims 16-19, 21, 24-26, and 28-32 are rejected.

Claims 1-15 and 27 are withdrawn.

Claims 20, 22, and 23 are cancelled.

### ***Withdrawn Rejections***

The rejection of claim 16-17, 19, 21, 24-26, and 28 under 35 U.S.C. 102 (b) as being anticipated by Bronkhorst et al. is withdrawn in view of applicant's amendments filed 09/12/2008.

The rejection of claims 16, 17, 19, 21, 24-26, 28 and 29 under 35 U.S.C. 103(a) as being made obvious by Bronkhorst et al. in view of Visscher et al. is withdrawn in view of applicant's amendments filed 09/12/2008.

The rejection of claims 16 and 18 under 35 U.S.C. 103(a) as being made obvious by Bronkhorst et al. in view of Kelm et al. is withdrawn in view of applicant's amendments filed 09/12/2008.

## **NEW GROUNDS OF REJECTIONS**

### ***Claim rejections - 35 USC § 112, 1<sup>st</sup> Paragraph***

Claims 16-19, 21, 24-26, and 28-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention.

This is a NEW MATTER rejection.

Claims 16 and 21 recite target cells that are not erythrocytes. The specification describes species of auxiliary cells that include erythrocytes [p.5] and species of biological target cells [p.9]. However,

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applicant's response filed 09/12/2008, does not point to support for the newly recited limitations directed to target cells that are not erythrocytes, and no support has been found for this limitation in the specification, drawings, or claims of the application as originally filed. As the newly recited limitations are not supported by the originally filed claims or disclosure, the claims are rejected for reciting new matter. This rejection is necessitated by amendment.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 16-17, 19, 21, 24-26, 28, and 30-32 are rejected under 35 U.S.C. 103(a) as being made obvious by Bronkhorst et al. (British Journal of Haematology, 1997, Vol. 96, p.256-258), in view of Kas et al. (US 6,067,859; Issued 30 May 2000), and in view of Endlich (2001; IDS filed 5/21/2004).

This following new grounds of rejection are necessitated by applicant's amendments filed 9/12/2008.

Bronkhorst teaches a method and system for studying cell-cell interaction in between red blood cells (i.e. erythrocytes) [Abstract]. An optical tweezer system is disclosed in detail [p.256, Methods] and includes a 1064-nm laser beam and microscopic imaging capabilities [Fig. 1]. It is noted that the

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specification [p.8] defines a long-wave laser beam to be between 700 and 1100 nm, therefore Bronkhorst teaches this limitation. In particular, Bronkhorst teaches applying two optical traps (i.e. multiple laser beams) to red blood cells in order to bring them together, allowing a brief period of aggregate formation wherein cells are attached, and then pulling cells apart using optical tweezers [p.256, Col. 2, last ¶]. Bronkhorst shows mechanical forces being induced to multiple cells to the point where they are pushed together [Fig. 1]. Therefore, Bronkhorst provides steps for adhering at least one erythrocyte (auxiliary object) to another erythrocyte (target cell), and applying optical tweezers on the auxiliary erythrocyte to indirectly move the target erythrocyte, which inherently shows inducing mechanical forces to a target by application of optical tweezers to an auxiliary object. Bronkhorst also provides a list [Table 1] of substances used that change the surface charge of the erythrocytes, and discloses that an anticoagulant was used to treat cells prior to experimentation [p.256, Col. 2, ¶3]. Therefore Bronkhorst shows surface charges with differing signs. Bronkhorst also conducts comparative experiments carried out in the presence of other macromolecules [p.257, Col. 2], which suggests the use of other cells in experimentation.

Bronkhorst does not specifically teach adhering at least one auxiliary object (i.e. erythrocyte) to a target cell that is not an erythrocyte, as in claims 16 and 21.

Bronkhorst does not specifically teach a target cell selected from epithelial cells, or a target cell that is a podocyte, as in claims 30-32.

Kas teaches a system for the micromanipulation of cells [Abstract, Col. 4-5, Summary]. In particular, Kas teaches experiments for trapping, moving, holding, and applying optical forces to deform different types of cells [Results, Col. 13-14, Col. 17], including red blood cells, PC12 cells, and epithelial cells [Col. 4-5, Col. 7, lines 20-30]. This device is beneficial how the cytoskeleton works in cells [Col. 5, ¶1].

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Endlich teaches methods for applying mechanical stress and strain to podocytes using magnetic beads [p.415, Results, Fig. 1, and p.420, Col. 1]. The results showed that podocytes are uniquely sensitive to mechanical stress compared to other cell types [p.420, Col. 1].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the method of Bronkhorst by adhering at least one erythrocyte (i.e. auxiliary objects) to a target cell that is not an erythrocyte, as in claims 16 and 21, and since Bronkhorst also conducts the same experiments carried out in the presence of other macromolecules [p.257, Col. 2], and since Kas shows different types of cells are commonly used when studying the effects of mechanical forces on cells [Col. 4-5, Col. 7, lines 20-30], which suggests the use of non-erythrocyte target cells. The motivation would have been to obtain comparative experimental results to determine cellular adhesion between different types of cells, as suggested by Bronkhorst [p.257, Col. 2].

It would further have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the method of Bronkhorst by using a non-erythrocyte target cell selected from epithelial cells, or a target cell that is a podocyte, as in claims 30-32, since Kas shows evaluating mechanical stress in epithelial cells using an optical tweezer-based system [Col. 4-5, Col. 7, lines 20-30], and since Endlich shows applying mechanical stress to podocytes (i.e. epithelial cells) using magnetic beads [p.415, Results, Fig. 1, and p.420, Col. 1]. The motivation would have been to better understand the unique mechano-sensitivity exhibited by podocytes, as suggested by Endlich [p.420, Col. 1] and to better understand how the cytoskeleton works, as suggested by Kas [Col. 5, ¶1].

Claims 16-19, 21, 24-26, 28-32 are rejected under 35 U.S.C. 103(a) as being made obvious by Bronkhorst et al. (British Journal of Haematology, 1997, Vol. 96, p.256-258), in view of Kas et al. (US 6,067,859; Issued 30 May 2000), and in view of Endlich (2001; IDS filed 5/21/2004), as applied to claims 16-17, 19,

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21, 24-26, 28, and 30-32, above, and further in view of Visscher et al. (Cytometry, 1993, Vol. 14, p.105-114).

Bronkhorst, Kas, and Endlich make obvious a method and system for producing optically induced mechanical forces on a target cell, as set forth above.

Bronkhorst, Kas, and Endlich do not specifically teach the use of fixed erythrocytes, as in claim 18.

Bronkhorst, Kas, and Endlich do not specifically teach the use of a confocal microscope, as in claim 29.

Kelm teaches the use of fixed and non-fixed erythrocytes in cell binding experiments [p.577, Col. 2, and p.578, Col. 1, ¶2].

Visscher et al. teach the use of a confocal scanning laser system for the micromanipulation of cells [Abstract] by inducing optical forces for manipulating a target comprising a confocal microscope, multiple beams, optical tweezers, and long wave beams [Fig. 1], [p.106, Col. 2, ¶ 3], and [p.112, Col. 2, ¶ 2]. Visscher et al. also teach unique multi-trap technique that provides a benefit of indirectly trapping biological objects using optical tweezers and multiple cells [p.113, Col. 1, ¶ 4 and Col. 2, ¶ 1] and [Fig. 7].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the method made obvious by Bronkhorst, Kas, and Endlich by using fixed erythrocytes, as in claim 18, since Kelm teaches the use of fixed and non-fixed erythrocytes in cell binding experiments [p.577, Col. 2, and p.578, Col. 1, ¶2]. The motivation would have been to use a well known technique for preserving cells for experimentation, as suggested by Kelm [p.578, Col. 1, ¶2].

It would further have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the method made obvious by Bronkhorst, Kas, and Endlich by using a

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confocal microscope, as in claim 29, since Visscher teaches a confocal cell trapping system, as shown above, and since Bronkhorst teaches multiple optical traps for cell manipulation, as shown above. The motivation would have been to provide a unique technique of for indirectly trapping biological objects using optical tweezers and multiple cells, as suggested by Visscher [p.113, Col. 1].

### ***Response to Arguments***

Applicant's arguments, filed 09/12/2008, that Bronkhorst in view of Visscher and Kelm do not teach or suggest a target cell that is not an erythrocyte or using erythrocytes as an auxiliary object to adhere to a target cell that is not an erythrocyte have been fully considered and are persuasive. However, a new ground of rejection has been applied in view of applicant's amendments.

Applicant's arguments that Bronkhorst does not teach the use of an optical tweezer to induce a mechanical force onto the cell have been fully considered but are not persuasive for the following reasons. Bronkhorst shows adhering at least one erythrocyte (auxiliary object) to another erythrocyte (target cell), and applying optical tweezers on the auxiliary erythrocyte to indirectly move the target erythrocyte, wherein the mechanical forces are induced to multiple cells and function to push the cells together until they are attached [p.256, Col. 2, last ¶, Fig. 1]. Therefore, Bronkhorst inherently shows inducing mechanical forces to a target by application of optical tweezers to an auxiliary object.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action



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is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pablo Whaley whose telephone number is (571)272-4425. The examiner can normally be reached on 9:30am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached at 571-272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**/Pablo S. Whaley/**

Patent Examiner

Art Unit 1631

**/John S. Brusca/**

Primary Examiner, Art Unit 1631